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- **FUJINO N ET AL: "MOBILE INFORMATION SERVICE BASED ON MULTI-AGENT ARCHITECTURE" IEICE TRANSACTIONS ON COMMUNICATIONS, vol. E80-B, no. 10, 1 October 1997 (1997-10-01), pages 1401-1406, XP000734533 ISSN: 0916-8516**

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**EP 1 056 306 B1**

## Description

[0001] The present invention relates to a method for the determination of the current position of a mobile device, a program element loadable into a memory of a mobile device, a mobile communications device with current position determination capability as well as to a network providing a current position determination capability for attached mobile devices.

[0002] The invention generally relates to the field of mobile computing and more specific, to problem of determining the current position of a mobile device with communication ability.

[0003] The external state of the art in the field of position determination of mobile devices includes the following techniques:

[0004] The first technique is hardware support based, i.e. the mobile device has a special support for hardware devices. GPS (Global Positioning System) and D (Differential) - GPS receiver as well as measurement equipment for the speed and direction of the user, such as f.e. car navigation systems, are devices which fall into said category. Figure 1 schematically shows a GPS Satellite connecting to a mobile client.

[0005] The next technique is network support based. In this case the network has means to determine the location of the mobile device. This can be done e.g. by using the base stations of the network or a triangulation method (see figure 1).

[0006] Another technique is based on a specific support on the mobile device. In this case the mobile device is equipped with a special module for determining the location e.g. a data base of streets and their location or a data base containing network identification and their current location.

[0007] GPS and some other known mentioned techniques are not useable indoors. On the one hand they can not be used indoors because they usually need a line of sight to the transmitter. On the other hand, the information that is provided by outdoor services is not very accurate. Indoor use requires much more precise location capability.

[0008] Today's GSM networks use the so-called GSM cell broadcast service to send location information to the mobile phones on a specific geographic area. This service can be offered by the network provider. Note that the position of the base station is transmitted, therefore not the position of the user, but only the cell he is located in is known. GSM cells, however, cover a huge range. The service relies on the network specific cell broadcast and is only useable within the GSM network as this solution works on layer 2 of the OSI model (see figure 7), i.e. the data link layer containing the specific GSM internal protocols.

[0009] Details of the cell broadcast short message service of the GSM service can be found in Redel et al, "GSM and personal communications handbook", 1998, Artec House, Inc.

[0010] From IEEE Personal Communications, October 1998, pages 8 to 24, a mobile access to web resources is known. The mobile device can be f.e. a laptop computer. Visualization of physical geography and object locations via a protocol for interactive floor maps is proposed. Local-area service discovery is based on embedding location information into a existing data network rather than using external information such as GPS coordinates. Outfitted subnets broadcast periodically a beacon packet to the local subnet addresses (and in some cases multicast with limited scope).

[0011] Departing from the above prior art it is therefore the object of the present invention to provide for a technique for the determination of the position of mobile devices which is platform independent.

[0012] This object is achieved by means of the features of the independent claims. The dependent claims develop further the central idea of the present invention.

[0013] According to the present invention therefore a method for the determination of the current position of a mobile device is provided. Stationary nodes of at least one network are provided with position information representing the stationary position of the corresponding node. The position information of at least one stationary node of the at least one network is transmitted to a mobile device. The current position of the mobile device is determined on the basis of the at least one transmitted position information. The transmission of the position information is effected above the transport layer (layer 4) of the OSI model such that the transmission is independent from the physical type of the networks and/or the transmission.

[0014] Without triangulation or generally, without processing position information of a plurality of stationary nodes, the precision of the determination of the current position of the mobile device essentially corresponds to the range of the transmission used which can be as small as f.e. 0.6 m in case of an Infrared transmission.

[0015] The transmission on the physical layer can be particularly effected such that is adapted for indoor use or generally for non-line-of-sight (NLOS) communication.

[0016] A broadcast mode can be provided in which the corresponding stationary nodes of the network send periodically their position information to mobile devices.

[0017] Alternatively or additionally, a request/reply mode can be provided in which the corresponding stationary nodes of the network send their position information to mobile devices only on request.

[0018] A conflict resolution function can be provided to detect the appropriate current position of the mobile device in case a plurality of different position information of different nodes have been transmitted to the mobile device.

[0019] The conflict resolution can be effected in the network or in the mobile device.

[0020] The position information furthermore can contain additional information about technical and/or geographical features of the network, such as e.g. the geographic extension of the corresponding network, room information and/or site information.

[0021] A geolocation server in the network can be provided being connected to a data base comprising the positional information of at least one stationary node of the corresponding network.

[0022] The position information can be broadcast or transmitted in a request-reply mode of communication.

[0023] According to another aspect of the present invention a program element comprising program code means loadable into a memory of a mobile device is provided. The program element is a application protocol above layer four of the OSI model, for

- receiving position information of at least one stationary node of a network, and
- determining the current position of the mobile device on the basis of the transmitted position information.

[0024] According to the present invention furthermore a mobile communications device with current position determination ability is provided. The device can comprise a communication controller designed to receive positional information from at least one stationary transmitting node of at least one network. The communication controller can be adapted to receive the positional information, which transmission is effected by means of an application protocol, i.e. a protocol above the transport layer (layer 4) of the OSI model such that the transmission is independent from the physical type of the networks and/or the transmission.

[0025] The mobile communications device can comprise a storage unit for storing positional information received.

[0026] According to another aspect of the present invention a network providing for a current position determination ability for mobile devices is provided. The network comprises at least one stationary node adapted to transmit position information representing the stationary position of the corresponding node. At least one stationary node is adapted to transmit the position information above the transport layer (layer 4) of the OSI model such that the transmission is independent from the physical type of the network and/or the transmission.

[0027] The at least one stationary node of the network can be adapted for a broadcast mode in which the corresponding positional information is broadcast periodically. Alternatively or additionally the at least one stationary node can be adapted for a request/reply position information transmission mode.

[0028] The network can comprise a geolocation server being connected to a data base comprising the positional information of at least one stationary node of the network.

[0029] Further advantages, features and objects of the present invention will come clearer from the following detailed explanation of embodiments and with reference to the figures of the enclosed drawings.

Figure 1 shows position determination techniques from mobile devices according to the prior art,

Figure 2 shows an example for the use of an infrared transmission to broadcast location position according to the present invention,

Figure 3 shows an example for the use of an IP (Internet Protocol) broadcast from a mobile device according to the present invention,

Figure 4 shows an example for using an IP (Internet Protocol) broadcast service from a geolocation server according to the present invention,

Figure 5 shows cells with a physical hand-over function,

Figure 6 shows the architecture of a stationary node and a mobile device according to the present invention, and

Figure 7 shows a comparison of the technique according to the present invention and a known GSM position determination solution using the ISO/OSI protocol layer representation.

[0030] With reference to figure 2 a first embodiment of the present invention will now be explained. A mobile device 1 can connect itself to (wireless) networks covering a small geographic area by means of an infrared transmission 2. The mobile device 1 can determine its current position by receiving positional information from stationary nodes 3 attached to the network 4. The mobile device 1 can for example query stationary nodes 3 about their location.

[0031] As the present invention is particularly adapted for indoor use, it is preferred that the mobile device 1 connects itself to local networks 4 with a limited geographic extension by means of an infrared (0.6 meter), wave LAN (100 meter to 400 meter), Ethernet (500 meter to 1500 meter) or Bluetooth (2.4GHz, 10m) network. If the position extension of the

network 4 is known, the mobile device 1 can determine its position with a certain limited range. If additional information can be extracted from the network 4 (e.g. on which stationary nodes 3 of the network 4 the mobile device 1 is connected), additional data bases can be searched for the position information.

[0032] In contrast to the prior art the program element according to the present invention can be applied to any kind of transmission and/or network 4, i.e. it is platform independent. Note that the network can for example be an IP (Internet Protocol) network. According to the present invention the transmission of the position information is effected on top of the TCP/IP or UDP/IP protocol stack (above layer 4 of the OSI model), while the known GSM solution works on layer 2 (the GSM internal protocols). With other words, the transmission of the position information according to the present invention is effected by means of an application protocol and therefore in the layer of E-Mail, WWW, TELNET, FTP, DNS and other applications of the TCP/IP protocol stack.

[0033] In contrast to the known GSM solution according to the present invention additional information can be attached to the transmitted position information, such that the transmitted information contains much more information than the information cell broadcast by GSM networks. Said additional information can for example be the geographic extension of the network, room information and/or site information. Details of said attached information can be found in table 1 further below.

[0034] The known GSM solution is based on a periodic broadcast, whereas according to the present invention a plurality of modes, such as for example a broadcast mode and a reply/response mode are provided.

[0035] As will now be explained with reference to figures 3 and 4 a communication means (special node) having the internal structure as shown in figure 6 (reference 5) is added either to a network infrastructure component (router, switches, etc.) or to one of the stationary attached devices in the network 4. This special node is called geolocation server 5 of the network 4.

[0036] The internal structure of the geolocation server 5 of the network 4 is shown in figure 6. A permanent (persistent) storing unit 6 contains the location of the corresponding stationary device and is called location store. A communication controller 8 is provided for answering queries or for broadcasting the information of the storing unit 6 on the network 4. A management controller 7 is provided for managing the communication means, e.g. setting the broadcast interval, changing the content of the storing unit 6, etc. The communication controller 8 is connected to the network 4 by means of a network interface 9.

[0037] The internal structure of a mobile device according to the present invention is shown in figure 6. A communication controller 12 is provided to send queries to the network 4 or to receive broadcast position information from the network 4. A transient storing unit 10 is provided for storing position information received. A so-called location API 11 is provided for accessing the position information from the operating system or applications of the mobile device 1. The communication controller 12 is connected to the network 4 by means of a network interface 13.

[0038] Using the devices as shown in figure 6, the mobile device 1 can access position information stored on the stationary node in the network 4. This can be effected in the following two modes:

#### 1. Broadcast mode

In the broadcast mode, the communication component in the network 4 uses the network broadcast facilities to periodically broadcast the current position information to the attached (mobile) devices. A mobile node just has to listen to incoming broadcast information packets. This can be of advantage, as the mobile device 1 can save power as it does not have to transmit query signals. The broadcast mode is shown in figure 4. In the shown example the server 5 broadcasts its position information on the network 4. The mobile device 1 receives the information in a passive mode.

#### 2. Request/reply mode

In this mode, the mobile device 1 requests the position information by sending its request on the network (for example by broadcasting) and waits for a reply from the nodes in the network 4. Figure 3 shows such a request/reply mode. As shown in the example of figure 3, the mobile device 1 requests the position information by sending a broadcast information to the network 4 and by receiving the coordinates correspondingly directly.

[0039] In addition to the above described modes, the geolocation server might send the geolocation information directly (not using broadcast) to the mobile device if it is able to determine the active (mobile) devices within its cell. This is especially useful if the network does not provide a broadcast service.

[0040] The information used to describe the location of the network can have different structure and encoding. The following table 1 gives an example of how this information can be structured using Key/Value pairs. Other structures are possible:

Table 1

Attribute	Meaning
Network.Sender	Location (position) of the transmitting stationary node.
Network. Extension	Geographic extension of the network (range of the transmission, e.g. 0.6 meter for Infrared).
Network. Name	Logical Name of the network.
Network.Room	Name of the room where the network is located.
Network.Building	Name of the building where the network is located.
Network.Locationname	Name of the location where the network is located.
Network. CellId	The CellId (cell identification) where the sending/stationary node is located. Can be used if the physical network provide transparent hand-over between different physical cells.
Network. Shape	The shape of the network with addition information, e. g. where the corners are located. E.g. a rectangle can be defined by declaring its four corners, a circle through its middle point and its extension, etc.

[0041] The given values are just examples. Not all of them must be present. Also addition information might be send.

[0042] Some wireless networks provide as shown in figure 5 cell hand-over on the physical level without changing the network on the network layer (layer 3). To have a more accurate indication of the geolocation, a Geolocation Server can be placed into each of the different physical cells. In this case, the information send to the mobile device will include the CellId of the physical network. By comparing this information with the current CellId of the physical network enables the mobile device to determine the current valid geolocation.

[0043] In both operational modes, the mobile device might receive answers from different machines. This might happen, if more than one machine in the network is configured to send the required information. The client must then perform a conflict resolution to find an appropriate location. Some forms of conflict resolution are:

- Building an intersection of the two received locations,
- Select one, e.g. the first incoming position information,
- Request the transmitting nodes to solve the problem between them such that the conflict is solve on the network side,
- Checking the CellId

## Claims

1. Method for the determination of the current position of a mobile device, the method comprising the following steps:

- providing stationary nodes (3) of at least one network (4) with position information representing the stationary position of the corresponding node (3),
- transmitting (2) the position information of at least one stationary node of the at least one network (4) to a mobile device (1),
- determining the current position of the mobile device (1) on the basis of the at least one transmitted position information,

wherein the transmission of the position information is effected above the transport layer (layer 4) of the OSI model such that the transmission is independent from the physical type of the networks (4) and/or the transmission (2).

2. Method according to claim 1, characterized in that the transmission (2) is effected on the physical layer such that it is adapted for non-line-of-sight communication.

3. Method according to anyone of the preceding claims, characterized in that a broadcast mode is provided in which the corresponding stationary nodes (3) of the network (4) send periodically their position information to mobile devices (1).

4. Method according to anyone of the preceding claims, characterized in that

a request/reply mode is provided in which the corresponding stationary nodes (3) of the network (4) send their position information to mobile devices (1) on request.

5. Method according to anyone of the preceding claims,  
**characterized in that**  
a conflict resolution function is provided to detect the appropriate current position of the mobile device (1) in case a plurality of different position information of different nodes (3) have been sent to the mobile device (1).
6. Method according to claim 5,  
**characterized in that**  
the conflict resolution is effected in the network (4).
7. Method according to claim 5,  
**characterized in that**  
the conflict resolution is effected in the mobile device(1).
8. Method according to anyone of the preceding claims,  
**characterized in that**  
the positional information furthermore contains additional information about technical and/or geographical features of the network.
9. Method according to anyone of the preceding claims,  
**characterized by**  
providing a geolocation server (5) in the network (4), the geolocation server being connected to a database (6) comprising the positional information of at least one stationary node (3) of the corresponding network (4).
10. Method according to anyone of the preceding claims,  
**characterized in that**  
the position information is broadcast.
11. Method according to anyone of the claims 1 to 10,  
**characterized in that**  
the position information is transmitted in a point-to-point communication.
12. A program element comprising program code means loadable into a memory of a mobile device,  
wherein the program element is a application protocol above layer four of the OSI model, for
  - receiving position information of at least one stationary node of a network (4), and
  - determining the current position of the mobile device (1) on the basis of the transmitted position information.
13. Mobile communications device with current position determination capability, the device comprising:
  - a communication controller (12) designed to receive positional information from at least one stationary transmitting node (3) of at least one network (4),wherein the communication controller is adapted to receive the positional information which transmission is effected above the transport layer (layer 4) of the OSI model such that the transmission is independent from the physical type of the networks and/or the transmission.
14. Mobile communications device according to claim 14,  
**characterized in that**  
it comprises a storage unit (10) for storing positional information received.
15. Network with a current position determination capability for mobile devices, comprising at least one stationary node (3) adapted to transmit position information representing the stationary position of the corresponding node (3), wherein the at least one stationary node is adapted to transmit the position information above the transport layer (layer 4) of the OSI model such that the transmission is independent from the physical type of the network (4) and/or the transmission (2).

16. Network according to claim 16,  
**characterized in that**  
 the at least one stationary node (3) is adapted for a broadcast mode in which the corresponding positional information  
 is broadcast periodically.

17. Network according to claim 16 or 17,  
**characterized in that**  
 the at least one stationary node (3) is adapted for a request/reply position information transmission mode.

18. Network according to anyone of claims 16 to 18,  
**characterized in that**  
 it comprises a geolocation server (5), the geolocation server (5) being connected to a database (6) comprising the  
 positional information of at least one stationary node of the network (4).

# Patentansprüche

1. Verfahren zum Bestimmen der aktuellen Position einer mobilen Einrichtung, wobei das Verfahren die folgenden  
 Schritte aufweist:

- Bereitstellen von stationären Knoten (3) von zumindest einem Netzwerk (4) mit Positionsinformation, welche  
 die stationäre Position des entsprechenden Knotens (3) zeigt,
- Übertragen (2) der Positionsinformation von zumindest einem stationären Knoten des zumindest einen Netz-  
 werks (4) zu einer mobilen Einrichtung (1),
- Bestimmen der aktuellen Position der mobilen Einrichtung (1) auf Basis der zumindest einen übertragenen  
 Positionsinformation,

wobei die Übertragung der Positionsinformation oberhalb der Transportebene (Ebene 4) des OIS Modells bewirkt  
 wird, so dass die Übertragung von der realen Art der Netzwerke (4) und/oder der Übertragung (2) unabhängig ist.

2. Verfahren nach Anspruch 1,  
**dadurch gekennzeichnet, dass**  
 die Übertragung (2) auf der realen Ebene so bewirkt wird, dass diese für Außersichtlinien-Kommunikation eingerichtet  
 ist.

3. Verfahren nach einem der vorhergehenden Ansprüche,  
**dadurch gekennzeichnet, dass**  
 ein Rundfunkmodus vorgesehen ist, bei dem die entsprechenden stationären Knoten (3) des Netzwerks (4) ihre  
 Positionsinformation zu mobilen Einrichtungen (1) periodisch senden.

4. Verfahren nach einem der vorhergehenden Ansprüche,  
**dadurch gekennzeichnet, dass**  
 ein Anfrage-/Antwortmodus vorgesehen ist, bei dem die entsprechenden stationären Knoten des Netzwerks (4) ihre  
 Positionsinformation auf Anfrage zu mobilen Einrichtungen (1) senden.

5. Verfahren nach einem der vorhergehenden Ansprüche,  
**dadurch gekennzeichnet, dass**  
 eine Konfliktauflösungsfunktion vorgesehen ist, um die geeignete aktuelle Position der mobilen Einrichtung (1) zu  
 ermitteln, wenn mehrere verschiedene Positionsinformationen verschiedener Knoten (3) zu der mobilen Einrichtung  
 (1) gesendet wurden.

6. Verfahren nach Anspruch 5,  
**dadurch gekennzeichnet, dass**  
 die Konfliktauflösung im Netzwerk (4) bewirkt wird.

7. Verfahren nach Anspruch 5,  
**dadurch gekennzeichnet, dass**  
 die Konfliktauflösung in der mobilen Einrichtung (1) bewirkt wird.

8. Verfahren nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Positionsinformation außerdem Zusatzinformation über technische und/oder geografische Merkmale des Netzwerks enthält.
- 5 9. Verfahren nach einem der vorhergehenden Ansprüche, **gekennzeichnet durch** Bereitstellen eines Geoort-Servers (5) im Netzwerk (4), wobei der Geoort-Server mit einer Datenbank (6) verbunden ist, welche die Positionsinformation von zumindest einem stationären Knoten (3) des entsprechenden Netzwerks (4) aufweist.
- 10 10. Verfahren nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Positionsinformation gesendet wird.
11. Verfahren nach einem der Ansprüche 1 bis 10, **dadurch gekennzeichnet, dass** die Positionsinformation in einer Punkt-zu-Punkt-Kommunikation übertragen wird.
- 15 12. Programmelement, welches eine Programmcodeeinrichtung aufweist, welche in einen Speicher einer mobilen Einrichtung ladbar ist, wobei das Programmelement ein Anwendungsprotokoll oberhalb der Ebene 4 des OSI-Modells ist, um
  - Positionsinformation von zumindest einem stationären Knoten eines Netzwerks (4) zu empfangen, und
  - die aktuelle Position der mobilen Einrichtung (1) auf Basis der übertragenen Positionsinformation zu bestimmen.
- 20 13. Mobile Kommunikationseinrichtung mit aktueller Positionsbestimmungsfähigkeit, wobei die Einrichtung aufweist:
  - eine Kommunikationssteuerung (12), die bestimmt ist, Positionsinformation von zumindest einem stationären Übertragungsknoten (3) von zumindest einem Netzwerk (4) zu empfangen,
- 30 wobei die Kommunikationssteuerung eingerichtet ist, die Positionsinformation zu empfangen, deren Übertragung oberhalb der Transportebene (Ebene 4) des OSI-Modells bewirkt wird, so dass die Übertragung von der realen Art der Netzwerke und/oder der Übertragung unabhängig ist.
- 35 14. Mobile Kommunikationseinrichtung nach Anspruch 14, **dadurch gekennzeichnet, dass** sie eine Speichereinheit (10) zum Speichern empfangener Positionsinformation aufweist.
- 40 15. Netzwerk mit einer aktuellen Positionsbestimmungsfähigkeit für mobile Einrichtungen, welches zumindest einen stationären Knoten (3) aufweist, der eingerichtet ist, Positionsinformation zu übertragen, welche die stationäre Position des entsprechenden Knotens (3) zeigt, wobei der zumindest eine stationäre Knoten eingerichtet ist, die Positionsinformation oberhalb der Transportebene (Ebene 4) des OSI-Modells zu übertragen, so dass die Übertragung von der realen Art des Netzwerks (4) und/oder der Übertragung (2) unabhängig ist.
- 45 16. Netzwerk nach Anspruch 15, **dadurch gekennzeichnet, dass** der zumindest eine stationäre Knoten (3) für einen Rundfunkmodus eingerichtet ist, bei dem entsprechende Positionsinformation periodisch gesendet wird.
- 50 17. Netzwerk nach Anspruch 15 oder 16, **dadurch gekennzeichnet, dass** der zumindest eine stationäre Knoten (3) für einen Anfrage-/Antwort-Positionsinformations-Übertragungsmodus eingerichtet ist.
- 55 18. Netzwerk nach einem der Ansprüche 15 bis 17, **dadurch gekennzeichnet, dass** es einen Geoort-Server (5) aufweist, wobei der Geoort-Server (5) mit einer Datenbank (6) verbunden ist, welche die Positionsinformation von zumindest einem stationären Knoten des Netzwerks (4) aufweist.



## Revendications

1. Procédé pour la détermination de la position courante d'un dispositif mobile, le procédé comprenant les étapes qui suivent :

action consistant à munir des noeuds stationnaires (3) d'au moins un réseau (4) d'une information de position qui représente la position stationnaire du noeud correspondant (3) ;  
transmission (2) de l'information de position d'au moins un noeud stationnaire de l'au moins un réseau (4) à un dispositif mobile (1) ;  
détermination de la position courante du dispositif mobile (1) sur la base de l'au moins une information de position transmise,

dans lequel la transmission de l'information de position est réalisée au-delà de la couche de transport (couche 4) du modèle OSI de telle sorte que la transmission soit indépendante du type physique des réseaux (4) et/ou de la transmission (2).

2. Procédé selon la revendication 1, **caractérisé en ce que** la transmission (2) est réalisée sur la couche physique de telle sorte qu'elle soit adaptée pour une communication en non ligne de visée.

3. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'un** mode de diffusion est prévu, mode selon lequel les noeuds stationnaires correspondants (3) du réseau (4) envoient de façon périodique leur information de position à des dispositifs mobiles (1).

4. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'un** mode requête/réponse est prévu, mode dans lequel les noeuds stationnaires correspondants (3) du réseau (4) envoient leur information de position entre des dispositifs mobiles (1) à la demande.

5. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'une** fonction de résolution de conflit est prévue pour détecter la position courante appropriée du dispositif mobile (1) dans le cas où les informations d'une pluralité de différentes informations de position de différents noeuds (3) ont été envoyées sur le dispositif mobile (1).

6. Procédé selon la revendication 5, **caractérisé en ce que** la résolution de conflit est réalisée dans le réseau (4).

7. Procédé selon la revendication 5, **caractérisé en ce que** la résolution de conflit est réalisée dans le dispositif mobile (1).

8. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'information de position contient en outre une information additionnelle concernant des caractéristiques techniques et/ou géographiques du réseau.

9. Procédé selon l'une quelconque des revendications précédentes, **caractérisé par** la fourniture d'un serveur de géolocalisation (5) dans le réseau (4), le serveur de géolocalisation étant connecté à une base de données (6) qui comprend l'information de position d'au moins un noeud stationnaire (3) du réseau correspondant (4).

10. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'information de position est diffusée.

11. Procédé selon l'une quelconque des revendications 1 à 10, **caractérisé en ce que** l'information de position est transmise selon une communication point à point.

12. Elément de programme comprenant un moyen de code de programme chargeable dans une mémoire d'un dispositif mobile, dans lequel l'élément de programme est un protocole d'application au-delà d'une couche 4 du modèle OSI pour :

recevoir une information de position d'au moins un noeud stationnaire d'un réseau (4) ; et  
déterminer la position courante du dispositif mobile (1) sur la base de l'information de position transmise.

13. Dispositif de communication mobile présentant une capacité de détermination de position courante, le dispositif comprenant :

un contrôleur de communication (12) qui est conçu pour recevoir une information de position en provenance d'au moins un noeud de transmission stationnaire (3) d'au moins un réseau (4), dans lequel le contrôleur de communication est adapté pour recevoir l'information de position dont une transmission est réalisée au-delà de la couche de transport (couche 4) du modèle OSI de telle sorte que la transmission soit indépendante du type physique des réseaux et/ou de la transmission.

14. Dispositif de communication mobile selon la revendication 13, **caractérisé en ce qu'il** comprend une unité de stockage (10) pour stocker une information de position reçue.

15. Réseau présentant une capacité de détermination de position courante pour des dispositifs mobiles, comprenant au moins un noeud stationnaire (3) qui est adapté pour transmettre une information de position qui représente la position stationnaire du noeud correspondant (3), dans lequel l'au moins un noeud stationnaire est adapté pour transmettre l'information de position au-delà de la couche de transport (couche 4) du modèle OSI de telle sorte que la transmission soit indépendante du type physique du réseau (4) et/ou de la transmission (2).

16. Réseau selon la revendication 15, **caractérisé en ce que** l'au moins un noeud stationnaire (3) est adapté pour un mode de diffusion selon lequel l'information de position correspondante est diffusée de façon périodique.

17. Réseau selon la revendication 15 ou 16, **caractérisé en ce que** l'au moins un noeud stationnaire (3) est adapté pour un mode de transmission d'information de position par requête/réponse.

18. Réseau selon l'une quelconque des revendications 15 à 17, **caractérisé en ce qu'il** comprend un serveur de géolocalisation (5), le serveur de géolocalisation (5) étant connecté à une base de données (6) qui comprend l'information de position d'au moins un noeud stationnaire du réseau (4).

FIG 1

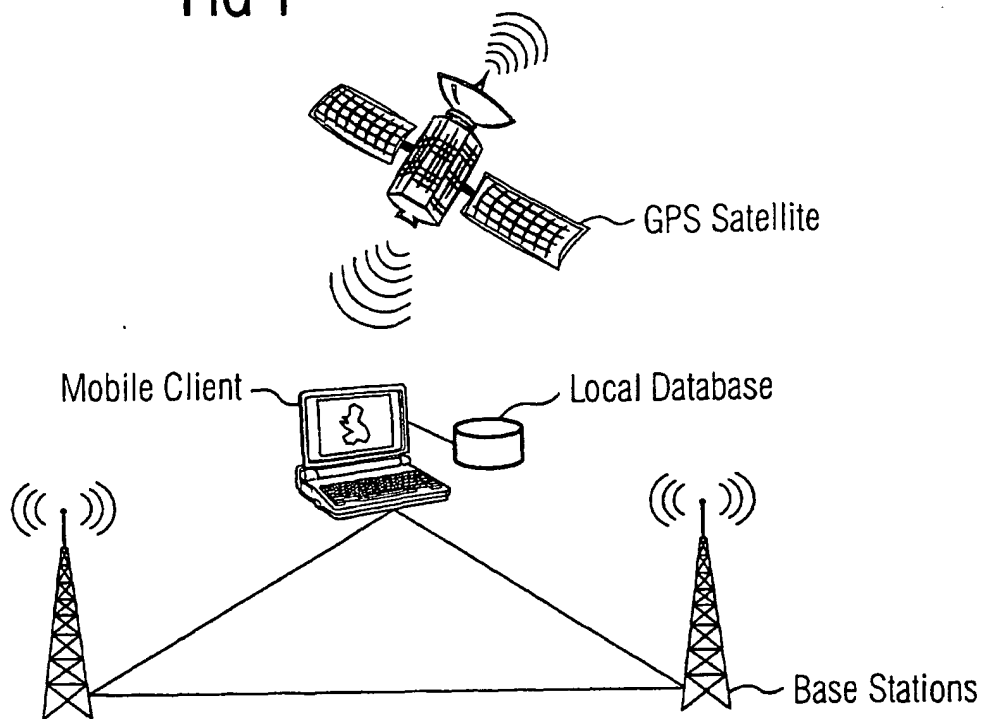


FIG 2

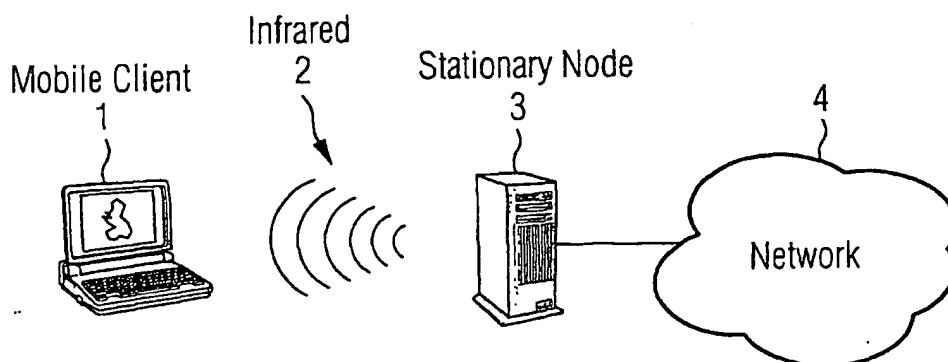


FIG 3

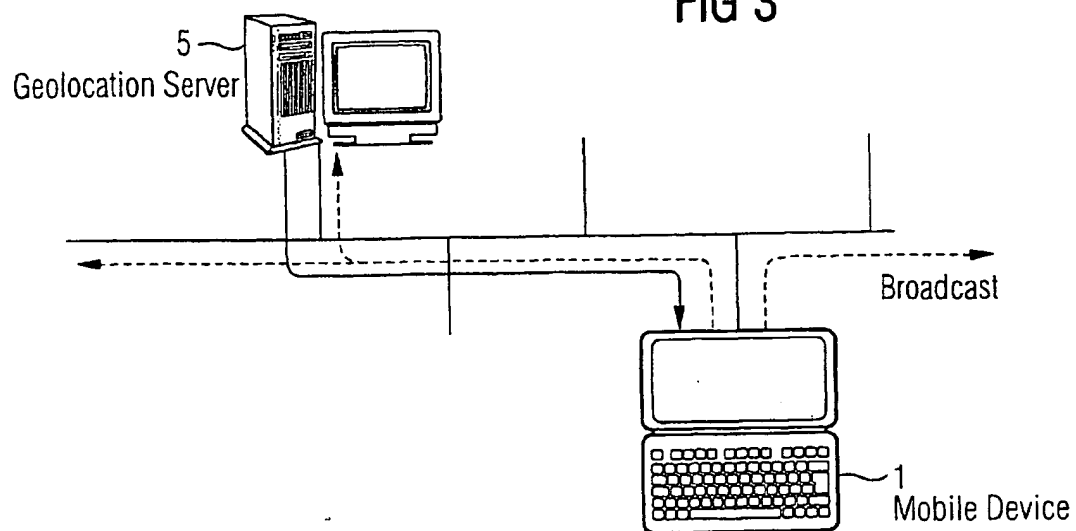


FIG 4

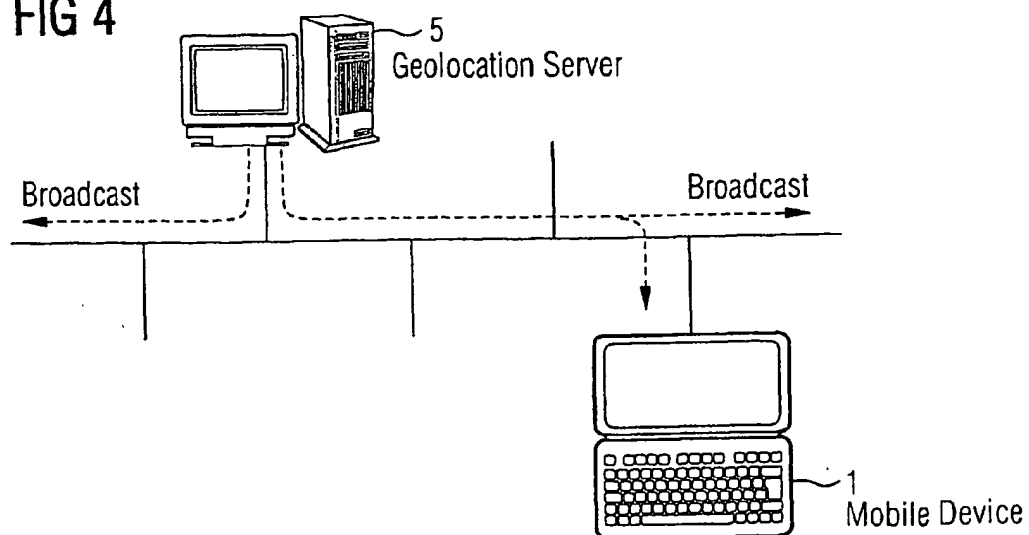


FIG 5

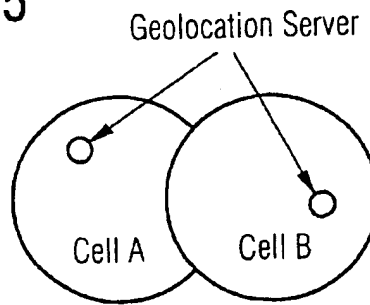


FIG 6

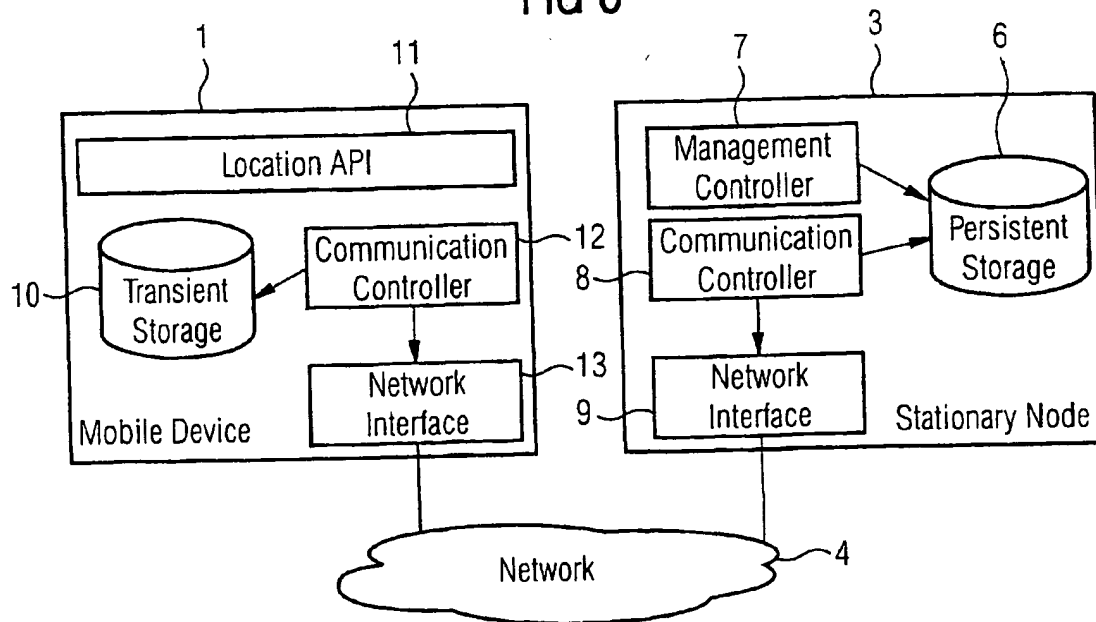


FIG 7

